

The columnist

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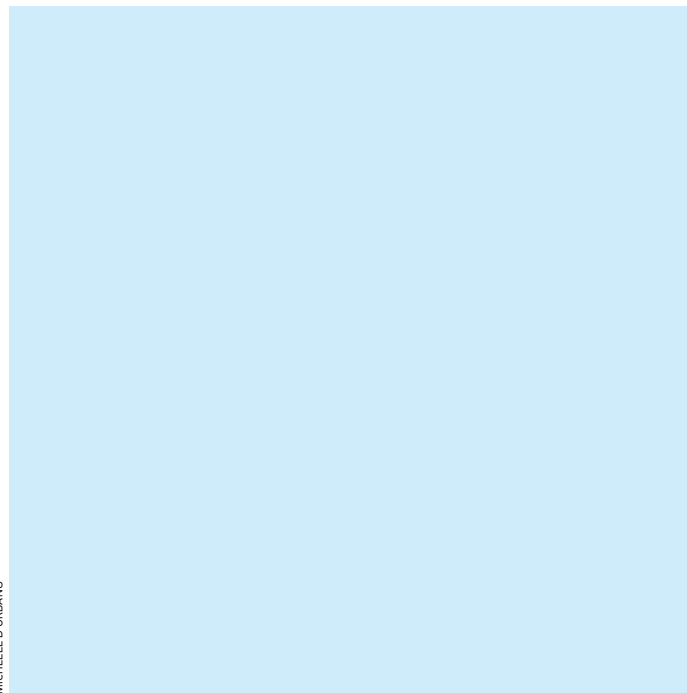
No miracle required

A focus on revolutionary green technologies is slowing the uptake of existing solutions to our problems, says **Mark Jacobson**

BILL GATES has put billions of dollars into new technologies he believes will help halt climate change: small modular nuclear reactors, biofuels, capturing carbon dioxide from the air (direct air capture) and geoengineering (reducing solar radiation by adding particles to the atmosphere). ExxonMobil is building a “blue hydrogen” plant that produces the fuel from natural gas and tries to capture the CO₂ emissions. The US Inflation Reduction Act provides funding that Gates, ExxonMobil and other companies can use to capture CO₂. It also helps to fund Gates’s dreams of small modular reactors and bioenergy.

The problem is that none of these technologies is useful for helping to solve the climate crisis, let alone the wider air pollution or energy security problems the world faces. We only have until 2030 to eliminate 80 per cent of the world’s greenhouse gas emissions and until 2035 to 2050 to banish the rest to avoid 1.5°C of warming. Moreover, 7 million people die prematurely each year due to air pollution and hundreds of millions more become ill. About 90 per cent of this pollution is from energy. Lastly, the world faces several energy-security risks, including the instability that will result from fossil fuels and uranium running out.

Given the magnitude and urgency of these problems, the best solution is one that can be implemented quickly, at low cost,



MICHELLE D'URBANO

while tackling all three issues at once. However, the technologies proposed by Gates and ExxonMobil, among others, don’t even attempt to address pollution or energy security – and they hardly help with climate change.

Carbon capture, direct air capture and blue hydrogen – which all require equipment and energy – increase air pollution, fuel mining and fossil-fuel infrastructure, while scarcely reducing CO₂. New nuclear plants have a 10 to 21-year time lag between planning and operation (too long to help solve the problems discussed here), costs

that are five to eight times those of new wind and solar power per unit energy, and CO₂ emissions that are nine to 37 times those of onshore wind. Bioenergy produces air pollution and greenhouse gases while using rapacious amounts of land and water.

Rather than searching for a miracle, we need to look at the wind, water and solar technologies right in front of us. Combining these with storage, efforts to encourage people to shift the time of their electricity use to even out demand, a well-interconnected electrical transmission system and efficient electrical appliances,

such as heat pumps, will allow us to solve all three enormous problems at low cost worldwide.

A wind, water and solar system would use much less energy than a combustion-based one. Globally, the energy that people use typically falls by over 56 per cent with these technologies. On top of that, wind, water and solar reduce the cost per unit energy by another 12 per cent on average, resulting in a 63 per cent lower annual energy bill worldwide.

The global upfront capital cost of building such a wind, water and solar system by 2050 is around \$62 trillion. However, due to the \$11 trillion annual energy cost savings, the payback time is less than six years.

What is more, we already have 95 per cent of the technologies we need to solve the problem. The ones we don’t have include long-distance aircraft and ships, and some industrial technologies, but we know how to shift to those.

We don’t require “miracle” technologies. To solve our problems, we need to avoid policies that divert funds from true solutions. We must educate the public and policy-makers about what works and what doesn’t, and thus overcome the misinformation that has distracted us to date. ■



Mark Jacobson is a professor of environmental engineering at Stanford University. His new book is *No Miracles Needed*.